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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,046	03/11/2004	Jung-hyun Lee	030681-634	4688
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ART UNIT		PAPER NUMBER		
2811				
NOTIFICATION DATE		DELIVERY MODE		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

**Office Action Summary****Application No.**

10/797,046

**Applicant(s)**

LEE ET AL.

**Examiner**

Ori Nadav

**Art Unit**

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 22 and 23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22 and 23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (6,844,604) in view of Chang et al. (3,996,021) and Seidl et al. (2002/0014647). Lee et al. teach in figure 1 and related text a capacitor of a semiconductor device (column 2, lines 66-67), the capacitor comprising:

a lower electrode (see column 1, line 48 and column 3, line 59);

an  $\text{AlO}(\text{Al}_x\text{O}_y)$  film 14 formed on the lower electrode;

an upper electrode formed on the AIO film; and

a dielectric film 14 having a dielectric constant that is higher than that of the AIO film between the upper electrode and the AIO layer,

wherein the dielectric film is an  $\text{HfO}_2$  layer, a  $\text{ZrO}_2$ , or an STO layer (column 2, lines 66-67), and

wherein the dielectric film is directly in contact with the upper electrode (since the first layer is an  $\text{HfO}_2$  dielectric film, see column 2, lines 66-67).

Lee et al. do not teach using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film.

Chang et al. teach using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film instead of  $\text{AlO}$  film (column 6, lines 33-50).

Seidl et al. teach in figure 1n and related text a capacitor comprising a lower electrode 60, an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film 70 formed on the lower electrode, and an upper electrode 80 formed in direct contact with the  $\text{AHO}$  film.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to replace the  $\text{AlO}$  film in Lee et al.'s device with an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film in order to improve the device characteristics.

The combination is motivated by the teachings of Chang et al. who point out the advantages of using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film instead of  $\text{AlO}$  film (column 6, lines 33-50).

Note that substitution of materials is not patentable even when the substitution is new and useful. *Safetran Systems Corp. v. Federal Sign & Signal Corp.* (DC NIII, 1981) 215 USPQ 979.

Regarding the claimed imitations of lower and upper electrodes, these features are inherent in Lee et al.'s device, because a capacitor must include lower and upper electrodes. Seidl et al. is also cited to teach a capacitor comprising a lower electrode and an upper electrode.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yeo et al. (6,936,881) in view of Chang et al. (3,996,021) and Seidl et al. (2002/0014647).

Yeo et al. teach in figure 4 and related text a capacitor of a semiconductor device, the capacitor comprising:

a lower electrode 110;

an  $\text{AlO}(\text{Al}_x\text{O}_y)$  film 112 formed on the lower electrode;

an upper electrode 114 formed on the AIO film; and

a dielectric film 112 having a dielectric constant that is higher than that of the AIO film between the upper electrode and the AIO layer,

wherein the dielectric film is an  $\text{HfO}_2$  layer, a  $\text{ZrO}_2$ , or an STO layer (column 9, lines 18-22), and

wherein the dielectric film 112 is directly in contact with one electrode.

Yeo et al. do not teach using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film, and does not explicitly state that the dielectric film is directly in contact with the upper electrode.

Chang et al. teach using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film instead of AIO film (column 6, lines 33-50).

Seidl et al. teach in figure 1 and related text a capacitor comprising a lower electrode, an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film formed on the lower electrode, and an upper electrode formed in direct contact the AHO film.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to replace the AIO film in Yeo et al.'s device with an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film and to form the dielectric film in direct contact with the upper electrode, in order to improve the device characteristics and in order to use the capacitor in an application which requires specific electrode positioning, respectively.

The combination is motivated by the teachings of Chang et al. who point out the advantages of using an AHO( $(\text{Al}_x\text{Hf}_{1-x})\text{O}_y$ ) film instead of AIO film (column 6, lines 33-50).

Note that substitution of materials is not patentable even when the substitution is new and useful. Safetran Systems Corp. v. Federal Sign & Signal Corp. (DC NIII, 1981) 215 USPQ 979.

Regarding the claimed imitations of lower and upper electrodes, these features are inherent in Yeo et al.'s device, because a capacitor must include lower and upper electrodes. Seidl et al. is also cited to teach a capacitor comprising a lower electrode and an upper electrode.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Conley Jr. et al. in view of Chang et al. (3,996,021) and Seidl et al. (2002/0014647). Conley, Jr. et al. teach in figure 5d and related text a capacitor of a semiconductor device, the capacitor comprising:

- a lower electrode;
  - an  $\text{AlO}(\text{Al}_x\text{O}_y)$  film 144 formed on the lower electrode;
  - an upper electrode formed on the AIO film; and
  - a dielectric film 143 having a dielectric constant that is higher than that of the AIO film between the upper electrode and the AIO layer,
- wherein the dielectric film is an  $\text{HfO}_2$  layer, a  $\text{ZrO}_2$ , or an STO layer (abstract),  
and

wherein the dielectric film is directly in contact with one electrode.

Conley, Jr. et al. do not teach using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film, and does not explicitly state that the dielectric film is directly in contact with the upper electrode.

Chang et al. teach using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film instead of AIO film (column 6, lines 33-50).

Seidl et al. teach in figure 1 and related text a capacitor comprising a lower electrode, an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film formed on the lower electrode, and an upper electrode formed in direct contact with the AHO film.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to replace the AIO film in Conley, Jr. et al.'s device with an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film and to form the dielectric film in direct contact with the upper electrode, in order to improve the device characteristics and in order to use the capacitor in an application which requires specific electrode positioning, respectively. The combination is motivated by the teachings of Chang et al. who point out the advantages of using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film instead of AIO film (column 6, lines 33-50).

Note that substitution of materials is not patentable even when the substitution is new and useful. *Safetran Systems Corp. v. Federal Sign & Signal Corp.* (DC NIII, 1981) 215 USPQ 979.

Regarding the claimed imitations of lower and upper electrodes, these features are inherent in Conley, Jr. et al.'s device, because a capacitor must include lower and upper

electrodes. Seidl et al. is also cited to teach a capacitor comprising a lower electrode and an upper electrode.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over (Lee et al., Yeo et al. or Conley Jr. et al.) each in view of Chang et al. and Seidl et al., as applied to claim 22 above, and further in view of Chooi et al. (6,486,080).

(Lee et al., Yeo et al. or Conley Jr. et al.) and Chang et al. and Seidl et al. teach substantially the entire claimed structure, as applied to claim 22 above, except an oxidation barrier film formed between the lower electrode and the AHO layer.

Chooi et al. teach an oxidation barrier film formed between the lower electrode and the AHO layer (column 2, lines 16-20).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an oxidation barrier film formed between the lower electrode and the AHO layer in prior art's device, in order to improve the device characteristics, .

### ***Response to Arguments***

Applicant's arguments with respect to claims 22-23 have been considered but are moot in view of the new ground(s) of rejection.



Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

O.N.  
5/21/2009

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TECHNOLOGY CENTER 2800